

**IN THE CLAIMS:**

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

1(Currently Amended). An antenna for use in a wireless environment, said antenna comprising:

a plurality of antenna elements generating a beam; and  
a lens collimating said beam in a desired direction such that said antenna ~~can be used to send~~ sends and receives signals from a desired direction.

2(Original). The antenna of claim 1, wherein said desired direction comprises a direction in which a high density of wireless users are expected to be present in said wireless environment.

3(Original). The antenna of claim 2, wherein said direction is along a road.

4(Original). The antenna of claim 1, comprising a plurality of lens including said lens, wherein each of said plurality of lens is provided in a corresponding direction.

5(Original). The antenna of claim 1, wherein said lens covers all of said antenna elements and forms a radome.

6(Currently Amended). A base station comprising:

an antenna containing a plurality of antenna elements and a lens, wherein said plurality of antenna elements generate a beam and said lens collimates said beam in a desired direction such that said base station ~~can be used to send~~ sends signals in said desired direction.

7(Original). The base station of claim 6, wherein said desired direction comprises a direction in which a high density of wireless users are expected to be present.

8(Original). The base station of claim 7, wherein said direction is along a road.

9(Original). The base station of claim 6, comprising a plurality of lens including said lens, wherein each of said plurality of lens is provided in a corresponding direction.

10(Original). The base station of claim 6, further comprising:  
a transmitter receiving a baseband signal and generating a broadband signal in a frequency range suitable for transmission by said antenna; and  
a divider receiving said broadband signal and generating an input signal for each of said plurality of antenna elements.

11(Original). The base station of claim 10, further comprising:  
an attenuator and a phase shifter connected in series between said divider and one of said plurality of antenna elements, said attenuator attenuating said input signal and said phase shifter shifting a phase of said input signal.

12(Original). The base station of claim 6, further comprising:  
a summing block receiving a plurality of electrical signals from said antenna elements and generating a broadband signal; and  
a receiver block generating a baseband signal from said broadband signal.

13(Original). A method of designing a lens located on top of a plurality of array elements in an antenna, said antenna generating a desired collimation pattern for radiations generated by said plurality of array elements, said method comprising:

determining a first radiation pattern of each of said plurality of array elements in the absence of said lens;  
determining a second radiation pattern of each of said plurality of array elements based on said first radiation pattern, wherein said second radiation pattern is computed with reference to a common origin for all of said plurality of array elements;

computing a composite radiation pattern (CRP) of said antenna based on said second radiation pattern for each of said plurality of array elements;  
characterizing said desired collimation pattern in the presence of said lens; and  
determining a shape of said lens is determined from the characterized collimation pattern and said CRP.

14(Original). The method of claim 13, wherein said first radiation pattern and said second radiation pattern are modeled according to a spherical modal approach, wherein said first radiation pattern contains a first plurality of coefficients and said second radiation pattern contains a second plurality of coefficients.

15(Original). The method of claim 14, wherein said first plurality of coefficients are determined by measuring a radiation at a radius R.

16(Original). The method of claim 15, wherein said second plurality of coefficients are determined by performing translation and rotation operations on said first radiation pattern.

17(Original). The method of claim 16, wherein said shape of said lens is determined by performing an inverse scattering operation using said CRP and said desired collimation pattern.

18. Canceled.

19(New). An antenna configured to generate a desired collimation pattern comprising:  
a plurality of antenna elements configured to generate a beam; and  
a lens configured to collimate said beam in a desired direction such that the antenna sends and receives signals from the desired direction, wherein a shape of the lens is determined using a composite radiation pattern of the antenna and the desired collimation pattern.

20(New). An antenna according to claim 19, wherein the composite radiation pattern of the antenna is determined according to a radiation pattern of each of the plurality of antenna elements.

21(New). An antenna according to claim 20, wherein the radiation pattern of each of said plurality of antenna elements is determined with reference to a common origin of the radiation pattern of the plurality of antenna elements.

22(New). A method of determining shape of a lens for an antenna, the antenna comprising a plurality of antenna elements, the method comprising:  
determining a pattern of radiation for each one of the plurality of antenna elements with reference to a common origin for the plurality of antenna elements;  
computing a composite radiation pattern for the antenna based on the pattern of radiation;  
characterizing a desired collimation pattern for the radiation using the lens; and  
determining the shape of the lens using the characterized collimation pattern and the composite radiation pattern.

23(New). A method according to claim 22, wherein the pattern of radiation is determined based on radiation patterns of each one of the plurality of antenna elements without the lens.

24(New). A method according to claim 22, wherein the shape of the lens is determined by performing an inverse scattering operation using the composite radiation pattern and the desired collimation pattern.

25(New). A lens for an antenna, the lens having a shape that is determined by characterizing a desired collimation pattern for the antenna and a composite radiation pattern of a plurality of antenna elements.

26(New). A lens according to claim 25, wherein the composite radiation pattern is determined based on a radiation pattern for the plurality of antenna elements, the radiation pattern being determined with reference to a common origin for the plurality of antenna elements.

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